

MINUTES OF THE KEPLER USERS PANEL
23-24 May 2012
Building N244, NASA Ames Research Center, Moffett Field CA

Prepared by: Alex Brown, Chair

Members Present: Patricia Boyd, Alex Brown, David Ciardi, Bernie McNamara, Richard Mushotzky (by telecon), Joshua Pepper (by telecon), Lucianne Walkowicz, Nick Gautier [Executive Secretary].

Members Absent:

Others: Natalie Bathala, Jessie Dotson, Mike Haas, Steve Howell, Doug Hudgins, Martin Still, Charlie Sobeck, Susan Thompson.

Minutes from 2011 Nov meeting: Approved.

Kepler Extended Mission Senior Review Results – Charlie Sobeck

The 2012 NASA Senior Review has approved a Kepler Extended Mission for up to four years. Level mission costs at ~ \$16.5M were allocated but the proposed GO and PSP support was cut by 50%. Recent loss of personnel in 2012 will ease costs in FY12/13 but further staffing reductions, at the level of 5-7 people, will be required in FY15. \$1M will be available for follow-up work in FY13.

Extended Mission Organization – Nick Gautier

The funded extended mission efforts will focus on a) the exoplanet survey, b) a limited follow-up program (FOP) to determine planet-host properties, c) estimation of pipeline completeness for eta-earth determination, d) the mission Legacy archive, e) supporting community observations, and f) an Education and Public Outreach (EPO) program.

All data and deliverables during the Extended Mission will become public immediately they have passed data quality certification.

Very little FOP work can be supported by the core mission and significantly more (but typically unfunded) effort will be needed from the general astronomical community to fully utilize the Kepler data output.

An advisory system will be required to ensure that the Mission has adequate feed-back, particularly to ensure that the eta-earth goals are achieved.

Extended Mission Target Selection – Mike Haas

Target down-selection will likely be needed by the start of FY15 and this will require lists by Fall 2013 to allow a response from the Guest Observer community in GO Cycle 6.

Considerable thought needs to be given to how different types of targets will be allocated/reallocated

during the Extended Mission when the Science Team structure will have ceased.

Spacecraft Status and Mission Operations – Charlie Sobeck

The current spacecraft operations have been mostly good with only a single cosmic ray safing recently. Some data has been lost due to increased solar activity and problems with reaction wheel zero crossings. The propellant supply is good until 2020 and is not yet a primary mission limiting factor. The down-link Ka band telemetry rate and increasing spacecraft distance are a steadily increasing concern. The only instrument failure continues to be a single CCD module – suggesting that this failure may represent a unique problem.

The major ground-system concern is the ever growing pipeline processing computer requirements and limitations in the currently available computer resources.

Data Processing Status – Mike Haas

Data processing is proceeding well with SOC Pipeline Version 8.1 implemented in February 2012 and Version 8.2 expected in June. The goal is to match the pipeline capability to the requirements of a 7.5 year dataset and consequently requires the renewal and updating of the hardware system. The TPS (transit planet search) component is currently not matched nor directly transferable to a supercomputer environment. The final goal is to have the ability to process 32 quarters of data in a 6-month time interval — the current system fails this requirement by a factor of 10.

The Pipeline documentation is out of date but it not clear when would be the optimum time for revision. The Science Office asks how much the community needs the Data Release Notes which are a significant sink of available personnel effort. The mission is on schedule to have fully reprocessed all the existing data by June/July 2012.

New developments: The SOC is investigating use of a “Multi-Scale MAP” that would track the cotrending basis vectors using a range of sampling timescales. Also by October one-page summary reports of the pipeline processing and results for each target will be available publically.

Exoplanet Archive Product – Martin Still

NExSci is being funded by NASA to provide an Exoplanet Archive. Kepler data and planet candidates will form part of this archive; in addition to the existing archive arrangement at MAST. The intention is that the NExSci archive will better foster community activities regarding exoplanet follow-up.

Science Team Status and Community Organization – Natalie Batalha

The KOI catalog now numbers over 2300 candidates and the plan is for new annual releases coinciding with Winter AAS meetings. The number of “Confirmed” Kepler planets is pulling ahead of the competing surveys.

Natalie discussed the future planned working group structure both for Eta Earth determination

and ancillary science. Potential difficulties in maintaining “Science Team” efforts as funding disappears. There was extensive discussion on how to maximize community involvement in all aspects of Kepler data utilization.

The existing working group structure already involves large numbers of people with six groups of 20-50 members. A working group related to stellar properties and coordination would be an important addition.

Archive Status - Susan Thompson

All pixels telemetered from the spacecraft are now being archived.

Improvements have been made regarding the data quality flags with the Quality Flags now present in the FITS files and being listed in the next version of the Archive Manual.

GO Program Status – Martin Still

Martin discussed the GO program, including the results of the Cycle 4 proposal review. Proposal pressure is holding steady but is still lower than optimal. The GO publication rate is steadily increasing and Kepler “astrophysics” papers are actually exceeding the number of exoplanet papers. Kepler observers can also seek support from the ADAP program and 25 Kepler ADAP proposals were submitted to the last ADAP review.

The staffing of the GO office is declining but there is still probably enough resources within the GO and SO offices to provide the necessary GO support.

Possible changes to the way the GO program operates were discussed, namely what possibilities were feasible for TOO (target of opportunity) observations and whether the proposals could be changed to a two stage format thereby removing full budgets and formal budget office procedures from the initial proposal effort.

Padi Boyd described an inter-mission collaboration between Swift and Kepler to conduct a shallow X-ray survey of the Kepler Field.

KUP in the Extended Mission – Steve Howell

Steve Howell presented a draft charter for the Extended Mission KUP and discussed the future role of the KUP.

Natalie Batalha discussed the “Kepler Science Council” (KSC – subsequently named the Kepler Exoplanet Council, as suggested by Bernie McNamara) which is intended to provide expertise to achieve the exoplanet extended mission goals. The KEC will play a significant role in exoplanet target selection. A draft KEC charter was discussed.

The future structure and functioning of the KUP was discussed and it was noted that there needs to be cross-representation from the KEC on the KUP and also ideally someone from the

KASC asteroseismology community.

Data Analysis Methods – Martin Still

Martin described the current efforts to develop or improve data analysis tools. The “Pipeline” software is so intrinsically tied to unique in-house databases that it would be extremely difficult to make it “public” — the KUP agreed with this position and concluded that any efforts to do so would be a poor use of mission manpower.

The pyraf PYKE tools are being restructured to work on multiple platforms and will work on LINUX/UNIX machines in the future. New tools are planned for exoplanet transit work, PSF-fitting photometry, and pixel-level variability studies. The timescale for new tools is ~ 1 year.

There was discussion regarding more effective ways to help the Kepler user community with data analysis. Padi Boyd the use of webinars, that an “ABC Guide” was urgently needed, and user’s questions might be better addressed by a better web-based FAQ page. Josh Pepper suggested that, with the ever-changing versions of the data-sets on MAST, there should be a notification system for when new versions of data processing are released and a way to tell what version of processing is currently on MAST without having to download the data and check the FITS headers. Martin Still mentioned his goal of developing video teaching tools for common analysis tasks. It was noted that there will be a need for final detailed pipeline documentation, particularly as the software itself is unlikely to be available beyond the end of mission.

Recommendations by the KUP

- The proposed Extended Mission advisory structure was approved in general. It is important that the KUP membership be broad-based with representation from the KSC and KASC in addition to the existing community representation.
- Target down-selection is a serious but indeterminate issue. A sensible framework needs to be in place for an unrushed discussion on how and when down-selection will be implemented.
- A two-phase guest observer proposal system would likely encourage greater participation in the GO program. It is the KUP’s opinion that this would be a significant improvement that would reduce the workload involved in preparing Kepler GO proposals.
- The possibility of introducing Target-of-Opportunity observational capability should be investigated. The introduction of TOOs might be a valuable addition to the next Senior Review proposal.
- Short-cadence target selection is currently a very disjunct system with targets being selected through a variety of channels. This system needs rationalization, given that short-cadence observations are a limited and precious resource.

- There is no point devoting mission effort in attempting to publically release pipeline software that cannot be divorced from the internal mission database environment.
- The format of future KUP meetings can be improved: It would be very useful to have advance notice of items that require recommendations from the KUP because this would prompt the necessary discussions. Presentations to the KUP should be produced in a manner that allows them to be made available to the wider Kepler user community as part of the record of the KUP meetings.

Future Meetings:

Plans for the next KUP meeting were not made as this will require input from the reconstituted KUP membership.